January-June Spring 2008 Page 1, Vol. 12, No. 1

# SMARA UPDATE

The Quarterly Newsletter of the Department of Conservation, Office of Mine Reclamation

## Dennis O'Bryant Named to Head OMR

Although **Dennis O'Bryant** spent many years around the Department of Conservation (DOC), it seems safe to say that Shakespeare didn't have him in mind when he wrote: "Time is come round, and where I did begin, there shall I end."

O'Bryant recently returned to DOC as Assistant Director in charge of the Office of Mine Reclamation (OMR) after a three-month hiatus at the Air Resources Board. While O'Bryant has been associated with the Division of Land Resource Protection (DLRP) for a long time, he was the chief of OMR when it started up, from 1991-1998.

"Dennis' vast knowledge of the department's many programs and his deep understanding of the issues and challenges facing OMR will prove valuable as he assumes his new duties," said Director **Bridgett Luther**, who appointed O'Bryant to the position.

Added the Director: "I also want to thank **Cy Oggins** for stepping up and taking on additional responsibilities as the Acting Assistant Director of OMR." Cy will continue as head of OMR's Abandoned Mine Lands Unit.

*(continued on page 6 )*

OFFICE OF MINE RECLAMATION

**Inside this issue:**



# Introducing Murshidul Hoque

Murshidul Hoque, a soil scientist born and raised in Bangladesh, is happy to join OMR's Reclamation Unit (RU). The first 13 years of Murshidul's professional career focused on soil and vegetation aspects of crop land in Bangladesh. Murshidul graduated with a PhD in Crop and Soil Sciences from Shimane University, Japan in 2000. His graduate studies focused on the effects of soil compaction and water stress on crops. He completed post-doctoral research in UC Davis's Department of Plant Sciences where he studied soil salinity, fertility, and water quality with respect to crops. In 2006, Dr. Hoque worked in the Department of Conservation's Division of Land Resource Protection, where he mapped land use throughout California for the Important Farmland updates. His extensive background in soil and plant fertility uniquely qualifies him to make a significant contribution to site evaluation, soil mapping and classification, and soil overburden and nutrient management analysis for revegetation in mine land reclamation. As a new member of the RU, Murshidul anticipates gaining new experiences and applying his soil sciences background toward effective reclamation of mined lands in California.

Murshidul will be contributing a series of articles on soil-related topics, which will include soil profile/ horizons, physical and chemical properties and biology, composition, pH, compaction, assessment of Mycorrhizae use, soil amendments by organic matter application, and soil sampling and testing for use in reclamation of mine lands. These articles will provide information useful to mine operators, consultants, and lead agencies for writing, reviewing, and implementing reclamation plans. The first article will be an introduction to soil and its related horizons (see Table 1).

# Soil - Its Components and Horizons

As a medium of plant growth, soil can be described as complex natural materials derived from disintegrated and decomposed rocks and organic matter that provide nutrients, moisture, and anchorage for land plants. Soil contains fine mineral particles, air, water, and dead organic matter and various types of living organisms (5%) **(Figure 1.1)**. A soil may vary widely, but generally lies within these ranges. The amount of air in soil pores varies inversely with the amount of water. The air in soil is typically lower in oxygen and higher in carbon dioxide than surface air, because of the respiration of plant roots and millions of soil microorganisms. The water in soil is called the soil solution and contains dissolved ions, plant nutrients, and other substances. The properties of soil vary from place to place, but this variation is not random.

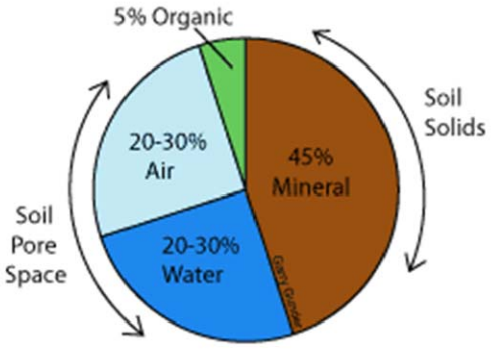


Fig.1.1. **The four components of soil.** Minerals and soil organic matter make up the solid fraction, whereas air and water comprise the pore space fraction.

*(continued on the next page)*

(**Soils** - *continued from page 3)*

A soil is both an ecosystem in itself and a key part of the larger terrestrial ecosystem. As a result, soil has many definitions, which can vary significantly depending on one's perspective. For example, soils can be thought of as a medium for plant growth, a regulator of water quality and quantity, an engineering material, a recycler of carbon and nutrients, or all of the above. An individual soil can occupy a large area or volume. The smallest representative unit of such a body is called a 'pedon'. A pedon has three dimensions and is comparable to a unit cell of a crystal. One soil body consists of contiguous similar pedons, collectively called polypedons. A pedon may range in area from 1 to 2 $m^2$, and it is bordered on all four sides by vertical sections, or soil profiles.

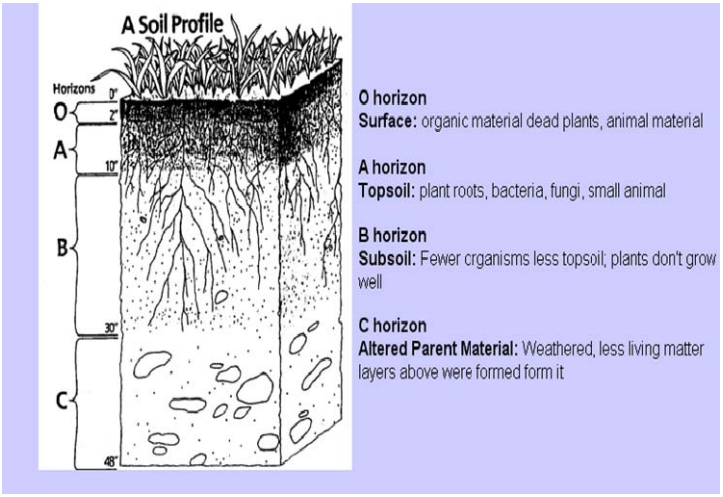


Fig. 1.2. A healthy soil profile showing the major horizons that may be present in a well-drained soil (NRCS).

A soil profile, which extends from the surface down to the parent materials, is composed of several horizontal layers called soil horizons. The O horizon is most common in forested areas. It is usually absent in grasslands, shrub-lands, and open forests, but present in dense forests. Agricultural fields and grassy areas do not have O horizon in their profiles. In grass-lands with no O horizon, the A horizon has the greatest percentage of organic material. The A horizon is thicker in forest and tropical soils than in prairie and desert soils. B horizons in tropical soil are very thick and may be broken down into two or more different layers. There is poor development of horizons in desert soils, with accumulation of calcium carbonate at or near the surface. The C horizon is much thicker in desert soil than the other type of major soils-with no organic matter accumulation.

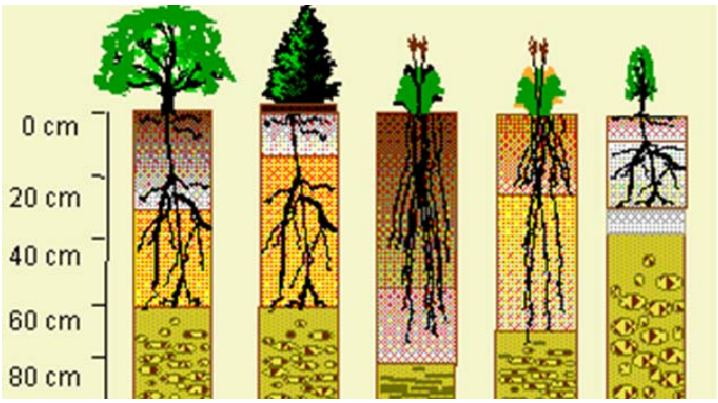


Fig. 1.3. Major soil types in the West.

The soil profile is an important consideration when growing plants. A soil's depth, texture, struc-ture, and chemical nature determine, to a large extent, the value of the soil as a medium for plant growth. Understanding of the soil profile is important in successful reclamation.

Murshidul Hoque
Environmental Scientist

# Using Conservation Easements and Land Trusts to Preserve Reclaimed Mined Lands- Part II
# Lakeside's River Park Conservancy

Mine sites are often reclaimed to end uses of open space, wildlife habitat, and public parks. To preserve a property's conservation values, several tools are available for landowners that can assist with managing the land while offering a range of tax benefits. In the last issue of SMARA Update, we discussed the basics of conservation easements and land trusts with an example from Tulare County. This time we'll look at another example of mined lands reclaimed to open space with the help of a land trust organization.

## The Lakeside River Park Conservancy in San Diego County

The community of Lakeside, located in eastern San Diego County, is a rapidly growing area of the San Diego River Valley. This part of the river has long been the home of extensive sand and gravel mining. But with mining operations nearing their end, river uses are entering a new phase. The Lakeside River Park Conservancy formed as a local nonprofit organization in 2001 to acquire land for restoration along Lakeside's 2½ mile stretch of the river.

Through grant funding and membership donations, the Conservancy acquires land by purchase and donations. Its first property acquisition after three years of negotiations was an 80-acre site of the former Vulcan Materials (aka CalMat) sand mine purchased at a fair market value of $8.6 million in 2003. The second purchase was an additional 20 acres of Vulcan property, which sold for $2.2 million in 2004. Hanson Aggregates has also committed to donating its 22-acre plant adjacent to this site as it phases out of operation.

This new park will be preserved in perpetuity with plans to restore a functioning river ecosystem, provide habitat for endangered species, improve water quality and flood control, and create multi-use trails.

Ponds and wetlands have been created by partially filling and regrading pits left behind from mining operations. Some of the riparian and wetland plants have come back on their own but many have also been planted. A wide variety of birds are frequent visitors, with new species spotted almost daily.

The early phases of the project involved extensive grading and invasive weed control. Now restoration implementation is fully underway. During winter 2007, volunteers planted 10,000 container plants and spread hundreds of pounds of seed, all local native species. The results of all the hard work and planning are beginning to take shape with plants showing rapid growth and blooming abundantly this spring along the trails, slopes, and wetlands.

Cleveland sage and bush monkeyflower are in full bloom among the recently planted oaks and sycamores lining the River Trail. A dedication plaque marks the oak in the foreground. Drip irrigation keeps the plants thriving.

Involving the local community with planting days and other special events builds local support and fosters stewardship for the new parkland. Lakeside's River Park Conservancy celebrated its Trail Preview and Second Annual Dedication Planting at the Park on February 9, 2008. Supporters who had purchased trees for the event had an opportunity to choose a place for their tree. The 2nd Annual 5K Trail Run/Walk was held on May 17, 2008 in conjunction with San Diego River Days. The date also marked the official opening of the River Trail.

Efforts to restore the San Diego River are not exclusive to Lakeside. The San Diego River Conservancy and the San Diego River Park Foundation, a coalition of 50 community-based land conservancies and friends groups, manage park preservation and river restoration with the goal of establishing a linear River Park from the Pacific Ocean to the river's headwaters near Julian. Some of the land for inclusion in this extensive river park system, both upstream and downstream from Lakeside, will be from former mine sites. The Lakeside River Park Conservancy's restoration of the former Vulcan and Hanson properties will set the standard for other restoration projects along other portions of the river. Reclaiming mined lands to open space, wildlife habitat, and public parks has caught the popular imagination in this corner of our state, a trend that is likely to continue.

Leah Gardner
Staff Environmental Scientist

Links and Resources:

Lakeside Riverpark Conservancy: www.lakesideriverpark.org/
San Diego River Park Foundation: www.sandiegoriver.org/

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(**O'Bryant to head OMR** - *continued from page 1)*

It's kind of like raising a child," O'Bryant said of returning to the office which he helped start. "You get it going in the right direction, hope for the best and then, years later, when it's mature, you see how things turn out. It's a subject I'm familiar with, interested in, and enjoyed working with in the past, and I'm looking forward to it again."

O'Bryant is a resident of Woodland who served for 11 years on the city's Planning Commission. He earned a Bachelor's degree from UC Berkeley in public policy with a specialty in resource policy, and a Master of Public Administration degree from California State University, Sacramento. He's an accomplished skier and all-around outdoorsman. During his brief stint at the Air Resources Board, O'Bryant worked on California's greenhouse gas reduction scoping plan. O'Bryant had stints at the Department of Parks and Recreation and the Department of Food and Agriculture before joining DOC in 1981. Initially, he helped DLRP begin the Farmland Mapping and Monitoring Program, which tracks land-use changes around the State. He then worked on environmental issues for the legislative unit before heading up the newly created OMR.

After his first tour of duty with OMR, O'Bryant was loaned to CALFED for two years to work on the Bay-Delta Plan. On his return, he became manager of DLRP's expansive Williamson Act program – which helps keep nearly 17 million acres of California land in agricultural use – and served as Acting Assistant Director in charge of DLRP from November 2003 to September of 2006.

OMR was created to administer the Surface Mining and Reclamation Act of 1975 (SMARA). Established to meet the Act's requirement, it provides assistance to cities, counties, state agencies, and mine operators for reclamation planning and promotes cost-effective reclamation. OMR strives to reclaim mined lands to a beneficial end-use through the implementation of SMARA, prevent or minimize the adverse environmental effects of mining by providing assistance to lead agencies and miners in the review of reclamation plans, and minimize residual hazards to public health and safety through the Abandoned Mine Lands program.

"A big issue now is that we need lots of material from the mining industry to rebuild the State's infrastructure. Making sure that the material is available and still ensuring that the environment is protected is a challenge. The abandoned mine issue is still a big one. We started to identify those mines the first time I was with OMR. Now we have some more resources to do something about them. Cy and his staff have been doing a great job. Making sure that lead agencies are in SMARA compliance is another challenge."

"So I know going in that I'm going to be busy, but it will be fun and I'm looking forward to getting to know and working with the OMR staff, with the Board, with industry, and with all the lead agencies."

| **Table 1. Soil Horizons:** Soil is characterized by a sequence of horizons. A vertical exposure of this sequence is referred to as a **soil profile**. Five master soil horizons are recognized using the capital letters (e.g., O, A, E, B, C; see also **Figures 1.2 & 1.3**). Each horizon in a generalized soil profile, as described below, contributes something to the soil's ability to support plant growth. | |
|---|---|
| **O Horizon (organic)** | The uppermost organic, or duff, horizon is formed from accumulated plant litter. This horizon, if it exists, insulates the soil from excessive heat or cold and protects fine-textured soil particles from the impact of raindrops, which can pelt and erode the bare soil surface. Decaying plant and animal matter creates humus, which provides a rich source of nutrients that are slowly released for sustained plant growth. |
| **A Horizon** | As litter decomposes, nutrients and organic matter tend to accumulate in the topsoil. Seeds, fungi, bacteria and small soil invertebrates are also abundant in the A horizon. Healthy topsoil is rich in organic matter and biological activity and often has a crumblike or granular structure rather than being powdery and close packed. The depth of the A horizon is important for plant growth, and topsoil is essential for successful revegetation. The natural process of topsoil formation occurs at a rate of about an inch per 1,000 years, which is why soil salvage is important for mine reclamation. |
| **E Horizon** | This is the horizon of maximum eluviations of silicate clays, iron, aluminum oxides, etc. The E horizon is a mineral horizon in the upper part of the soil. Typically present only in forested areas, it underlies an O or A horizon. |
| **B Horizon (Illuvial)** | As water percolates through the A horizon, it slowly leaches minerals out of the soil matrix and carries them down to the B horizon. This movement and the higher sub-surface moisture content cause the B horizon to be enriched in clays. Clays hold more plant-available water than sands or silts, a critical factor on dry revegetation sites. On the negative side, a clay layer can become so dense that root penetration is difficult. In addition, salts and toxic metals may accumulate in the B horizon. Because the A horizon has the greatest concentration of organic matter and the B horizon has more clays or salts, the boundary between the two horizons is often where the darker, browner color of the A horizon changes into the lighter, grayer or redder B horizon. |
| **C Horizon** | The C horizon represents the underlying substrate, or parent material, that is being transformed into soil materials. Subsurface horizons are not commonly conducive to plant growth because they are excessively coarse or fine textured or have low levels of plant-available nutrients. Materials similar to the C horizon are typical of the overburden and commodity material exposed at many mine sites. The C horizon is outside the zones of major biological activity and is generally little affected by the processes that formed the horizons above it. |
| **R horizon** | The R horizon is found in underlying consolidated rock and is normally considered the bedrock, which shows little to no effect of weathering. |

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# One Abandoned Shaft, Two Remediation Projects

The Trade Rat shaft as it was discovered in 2002.

The Office of Mine Reclamation's Abandoned Mine Lands Unit (AMLU) has helped to remediate more than 480 abandoned mine features (e.g., shafts and adits) in the last six years, but AMLU staff have never needed to remediate the same feature twice. That is, until they came across the Trade Rat Mine shaft in San Bernardino County.

The Trade Rat Mine is located on a State Lands Commission (SLC) parcel near Barstow in a remote area accessed via a long drive down bumpy jeep trails. Off-Highway Vehicle (OHV) enthusiasts and recreational gold prospectors are regular visitors. Small sand piles created by "dry washing" for gold dot the landscape.

The AMLU's Jon Mistchenko and Sean Conlon first visited the site in 2002 to record mine feature locations and assess physical and chemical hazards at the site.

They found a shaft about 15 feet in diameter that descended in a steep curve for roughly 120 feet. Just a few feet away lay a jeep trail that approached over a blind crest and curved around the south side of the shaft. The shaft's collar was in loose waste rock, and the edge near the jeep trail was severely undercut.

The AMLU notified the SLC of this hazardous site, and the agencies decided to build a fence around the shaft to prevent accidental entry. Mistchenko and Sam Hayashi (AMLU) and Greg Pelka (SLC) installed a t-post and smooth wire fence. Hardware cloth was buried at the base of the fence to protect the endangered desert tortoise.

The fence was still effective in 2007, but two braces were dangling into the shaft. Note how the shaft has grown in the direction of the truck.

In Winter 2005 and Spring 2006, Brown-Berry Biological Consulting conducted wildlife surveys as a first step towards permanently closing the Trade Rat shaft. After underground inspection and an outflight survey at dusk, Pat Brown recommended backfilling the shaft due to the lack of significant habitat and the hazard posed by the mine: thousands of pounds of loose rock had broken free and fallen into the shaft, increasing the diameter of the collar, moving the unstable edge even closer to the jeep trail, and undermining the fence.

In October 2007, Brown-Berry led a wildlife exclusion at the shaft. Pat Brown, Bob Berry, Pelka, and Mistchenko used night vision equipment to monitor the shaft for wildlife use after sunset. This process allows any bats or birds to leave the mine at dusk, after which the shaft is covered with chicken wire. No wildlife usage was recorded on two consecutive nights, and the chicken wire was left in place until the next day when a backhoe arrived.

Under the direction of Pelka, the backhoe pushed the waste rock pile back into the shaft and compacted the area, then a pile was built atop the fill to counteract the formation of a depression as the fill settles. While on site, the backhoe also filled in two adjacent shallow mine features. Mistchenko and Pelka collected the fence posts, wire, and tortoise fencing and then reused the materials one month later to fence an abandoned mine shaft on a different SLC parcel.

Fencing the shaft provided a quick, basic level of safety and gave the AMLU and SLC time to design a permanent solution and address historical and wildlife concerns. The result was a cost-effective backfill closure of this hazardous abandoned mine shaft.

Jon Mistchenko
Engineering Geologist

The shaft after backfilling is complete. The surface of the dump was left rough to facilitate revegetation.

# Successful Desert Reclamation Workshop by OMR and VVC

The Reclamation Unit of the Office of Mine Reclamation (OMR) presented a two-day workshop on Desert Mine Reclamation hosted by Victor Valley College (VVC) in Victorville on March 4 and 5, 2008. The first day included a series of PowerPoint lectures given by OMR staff. Topics covered the SMARA requirements for reclamation plans, with an expanded segment on revegetation. The talks were geared towards the special challenges of mine reclamation in desert sites. Almost half of the state's 1400 active mines are located in the six counties comprising the arid southeastern corner of the state (San Diego, Imperial, Riverside, San Bernardino, Kern, and Inyo).

Of the 54 attendees, 22 were college students. The others were a mix of lead agency planners (counties and cities), mine operators, and environmental consultants. Neville Slade, Department Chair for the college's Agriculture and Natural Resources Department (ANR), provided an introductory talk about the Mojave Sustainability Project (see SMARA Update, Winter 2007 – "A Partnership Blooms in the Desert") and wrapped up the day with a tour of the department's green-houses, seed lab, and demonstration garden.

For the second day of the workshop, participants traveled in college vans to visit two active limestone mines in the Lucerne Valley area of San Bernardino County. The site visits allowed everyone to see examples of mining and reclamation in action.

OMR would like to thank all of those who came to join us, and to the ANR department of the Victor Valley College for their help in providing a great venue for a successful workshop!

Leah Gardner
Staff Environmental Scientist

Workshop participants browse the plant selection inside one of the many greenhouses located at Victor Valley College used for growing drought-tolerant native species for mine reclamation.

# Santa Barbara Botanical Garden Hosts Reclamation Workshop

On June 3, the Office of Mine Reclamation's (OMR) Reclamation Unit presented a workshop titled "Preparation and Review of Reclamation Plans" in the Blaksley Library of the Santa Barbara Botanical Garden. Of the 25 participants, six lead agencies were represented along with several mining companies and environmental consulting firms. Topics covered by OMR staff included End Uses, Topsoil Management, Revegetation, Erosion Control, Slope Stability, Hydrology, Water Quality and other requirements for mine reclamation plans to satisfy the Surface Mine and Reclamation Act and the California Code of Regulations.

With its sunny coastal weather, masses of blooming flowers and choruses of singing birds, the Santa Barbara Botanic Garden provided an idyllic setting for the spring workshop. The Garden is an educational and scientific institution dedicated to the study, display and conservation of the California native flora. With an emphasis on plants native to California, the Garden advances the knowledge and understanding of plant life and provides a rewarding experience for visitors. During breaks and the lunch hour, workshop attendees could stroll among the beautiful plantings covering 78 acres crisscrossed by five miles of hiking trails or browse the gift shop and retail nursery to purchase a selection of the many native plants on display. Thanks to the Botanical Garden for hosting the event and to participants who attended the workshop.

The Botanical Garden grows and sells a wide variety of native plants.

Additional workshops are in the planning stage for later this year, including a two-day workshop in Mt. Shasta, Siskiyou County, in mid-September. Check our website for details and registration information at http://www.conservation.ca.gov/omr/workshops/

Leah Gardner
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OFFICE OF MINE RECLAMATION

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*The purpose of this publication is to impart the latest reclamation tips as well as changes in SMARA-related legislation or the interpretation of existing statutes by court decisions.*

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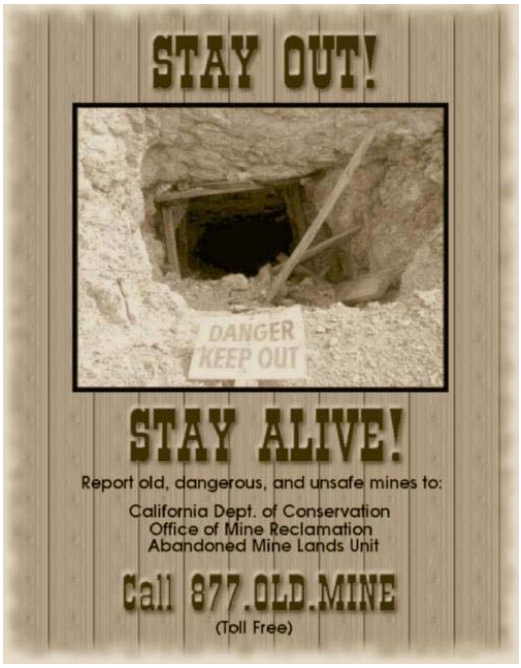


## SPOTLIGHT

## Top 10 Counties with Abandoned Mines (of ~47,000 statewide)*

| County | # Abandoned Mines (by landowner type) | | | | | |
|---|---|---|---|---|---|---|
| | Total | Federal | State | Local | Nonprofit | Private |
| San Bernardino | 12,221 | 9,583 | 259 | 0 | 0 | 2,379 |
| Inyo | 9,698 | 8,435 | 158 | 176 | 0 | 929 |
| Kern | 4,498 | 2,459 | 22 | 0 | 0 | 2,017 |
| Mono | 2,519 | 2,067 | 204 | 31 | 0 | 217 |
| Riverside | 2,505 | 1,377 | 43 | 3 | 0 | 1,082 |
| Siskiyou | 1,696 | 1,040 | 1 | 0 | 0 | 655 |
| Mariposa | 973 | 369 | 0 | 0 | 0 | 604 |
| Imperial | 913 | 741 | 40 | 0 | 0 | 132 |
| Placer | 747 | 393 | 1 | 0 | 0 | 353 |
| Tuolumne | 697 | 305 | 0 | 0 | 0 | 392 |

* For information on how OMR's Abandoned Mine Lands Unit can help public agencies remediate abandoned mine features on public lands, including county- or city-owned lands, call (877) OLD-MINE.

***OMR - Ensuring mined lands are returned to a beneficial end use after mining.***